## CHAPTER-26

# FLORISTIC ANALYSIS OF HARDA DISTRICT, MP: ASSESSMENT OF RARE, ENDANGERED AND THREATENED TAXA

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## Summary

Harda district is located in the eastern part of Madhy Pradesh,India and bordered by the district of Sehore to the north, Narmadapuram to the southeast, Khandwa to the south and west, and Dewas to the northwest. Total geographical area of Harda district is 2644.32 sq km covering 780.92 sq. km of forest. The southern part of the district is covered by Satpura hill ranges, extended part of Malwa plateau and Narmada valley. It has 3 tehsils namely Khirkia, Harda and Timarni. Harda district shows rich species diversity due to its unique phytogeographical position, variable topography, climate, soil and dense vegetation. Present study was aimed to document the flowering plant diversity of Harda district, MP and assessment of threatened taxa.

756 wild and naturalised flowering plant species have been reported from Harda district, MP .These 756 plant species are distributed in 523 genera and 112 families. Dicotyledon includes 566 plant species, 399 genera and 90 families. Different growth habit of a total 513 plant species are herbs, 53 shrubs, 121 trees and 69 climbers. An analysis of life form shows that herbaceous species (68 %) exhibit maximum diversity followed by trees (16%), shrubs (7 %) and climbers (9%). Phytodiversity of Harda district is facing different degree of threats due to heavy biotic pressure, habitat loss, megaprojects, overexploitation, trade value, overgrazing and intensive invasion of exotic species. Present study reports 91 rare and threatened flowering plant species which are distributed in 46 families and 86 genera. 14 species are observed in the study area under Critically Endangered category. Acampe praemorsa (Roxb.) Blatt. & McCann, Acorus calamus L., Hellenia speciosa (J. Koenig) S. R. Datta, Microchirita hamosa (R. Br.)Yin Z.Wang and Eulophia picta (R.Br.) Ormerod are facing high risk of extinction. 29 plant species are recorded under endangered category. Asparagus racemosus willd., Centella asiatica (L.) Urb., Crinum latifolium L., Gloriosa superba L., Habenaria marginata Colebr., Cynanchum acidum (Roxb.) Oken, Zingiber roseum (Rox.) Roscoe are become endangered in the area. 21 plant species are found under vulnerable category. These plants are now common in the area but declining at alarming rate due harvesting for their medicinal value, overexploitation and trade value. Important plants of this category are Baliospermum solanifolium (Burm.) Suresh, Curculigo orchiodes Gaertn., Drimia indica (Roxb.) Jessop, Enecostema axillare (Poir. Ex Lam) A. Raynal, Hemidesmus indicus (L.) R.Br. Chlorophytum tuberosum (Roxb.) Baker, Ceratosanthes palmata Urb., Vincetoxicum rotundifolium (Buch Ham ex wight) Kuntze, Uraria picta.(Jacq.) Desv. Ex Dc.

Keyword: Floristic analysis, Harada District (MP), Phytodiversity, Threatened Taxa.

# Introduction

Harda district, located in the eastern part of Madhy Pradesh, India ,was officially declared a separate district by Government of Madhya Pradesh on 6<sup>th</sup> July, 1998. Earlier it was a part of Narmadapuram(Hoshangabad) district. Harda was one of the prominent regions in the erstwhile MadhyaPrant and encompassed the area of "Siwni Malwa". The area is called Bhuana area due to its more fertlized land. The villages, Handia and Bihola were a prosperous village during Mughal period. Previously in the southern region of Harda there was 'Makdai' rule and the 'Gond' king was the ruler. Korku and Gond are the dominating tribe inhabitating in the south hilly region of Harda. It is rich in biodiversity which are frequently interrupted in buffer zone by scrub jungles, grassy patches, crop fields and hilly forest.

**Geography:** Harda district is located at Latitude: 22° 19' 48.00" N Longitude: 77° 05' 60.00" E .The area is bounded by the district of Sehore to the north, Hosangbad to the southeast, Khandwa to the south and west, and Dewas to the northwest. The southern part of the district is covered by Satpura hill ranges and extended part of Malwa plateau, and Narmada valley. Total geographical area of Harda district is 2644.32 sq. km covering 780.92 sq. km of forest. It has 3 tehsils namely Khirkia, Harda and Timarni. Harda district shows rich diversity due to its unique phytogeographical position, variable topography, climate, soil and dense vegetation.

**Demography:** The total population of the district is 5, 70,302 according to 2011 census. Harda district predominantly a tribal area and it has a significant population of native people where 44.26 % populations are tribals. Dominant tribes in the area include Korkus, Gound, Bhil and Bhilala. Nahala, Mawosiruma, Bawari and Bodoya are the Sub tribes of Korkus . Gonds are the largest tribal community in India. Gonds recognise themselves as 'Koythor' which means mountain man. Gond is basically lived in remote and dense forests area in the the study area.

**Geology:** Geology is concerned it can be mentioned that granite and megnieses rocks existing either side of Narmada are of Archen age. It is followed by Precambrian Bijawar series rocks of Cudapha system and it is chemically composed of quartz and crystals of orthoclase and plagioclase. In these rocks some fraction of chlorite and hornblende also occur. The formation of the Harda district includes, the upper cretaceous lameta bed rocks near Handia are composed of grit stones and conglomerates occasionally associated with lime stones but the district mainly is occupied by Deccan trap and volcanoes rocks. In the Deccan trap extends from the Satpura ranges and it is made up basaltic rocks. The soil as chiefly belongs to ash of Deccan trap and it is also called fertile black cotton soil. Reddish brown soil is also found in area.

**Soil:** Soil of the Harda district is an important arena of its natural wealth. Formation of soil is depends on climate and geological formation and rocks have played an important role in formation of vegetation pattern. Growth of plants depends upon presence or absence of minerals in rocks. Soil of the study area is characterized by red and black alluvium and lateritic soils. These soils are commonly known as black soils. Some parts of the area are covered by sandy clay loam soil immediately on the banks of Narmada River. Remaining part of the study area is occupied by clay loam soils. Soil is considered good for plant nutrition and it is general calcareous, neutral to mild alkaline in reaction with pH values ranging from 6.5 to 8.5.

**Climate:** The climate of region is hot and it is affected mainly by rainfalls, temperature and relative humidity. The climate of the Harda district is characterized by a too hot summer and general dryness except during the south west monsoon season. There are 3 distinct seasons, variable in the study area viz. winter, summer and monsoon. Winter, persists from last weeks of October to mid of February. Summer extends from March to June, May are hottest month where the mercury is very high. Monsoon, arrives in last week of June extends up to September followed by heavy rains in July to August and then gradually slowed down and almost comes to end by last of September. November to May is rainless months although few showers occur in December or January but they bring little change in the vegetation.

**Rainfall:** The average rainfall of the Harda district is 1124.2 mm. It receives maximum rainfall during southwest monsoon period. About 95.5% of the annual rainfall is received during monsoon season and only 9.5% of the annual rainfall takes place during October to May period.

**Temperature:** In the Harda district April –May is the hottest months of the year. Highest temperature is in between  $30^{\circ}$  c to  $46^{\circ}$  C. The winter season is November -February with coldest month's average minimum temperature of Jan is  $19^{\circ}$ C to  $22^{\circ}$ C.

**Relative humidity:** The relative humidity is highest in August (83.4) .Conversely April is the driest month in which the relative humidity is 30.7% .The relative humidity recorded minimum in rainless months of April-May and maximum in monsoon months during July- August.

**Topography:** The topography of Harda consists of series of hill ranges of Satpura and Vindyas and Narmada valley. The general topography is hilly and numerous river and rivulets.

The district can be divided in three major divisions

- Satpura ranges and extension of Malwa plateau in the South.
- Ridges (Equivalent to Aravalli Hills) in the North –West.
- Alluvial plain in the North-East and central part.

**Drainage system:** Major drainage systems are Narmada and its tributaries namely Ganjal, Anjal, Sukni, Midkul, Dedra, Machak, Sayani and Kalimachak rivers. The river Narmada flows along the Northern boundary of the district. The Gangal river is the major tributary of the Narmada river and flows from South to North along the Eastern boundary of Harda district before draining into the Narmada River.

# Methodology

Plant exploration work was carried out from 2015, covering all seasons and various types of vegetation. Vegetation on forest in different altitudinal ranges, wastelands, weeds of cultivated fields, road side, river banks, Ponds and streams beds were studied. Plant specimens were collected in flowering or fruiting stage. Plant were collected and Herbarium specimens were prepared as per conventional methods (Rao and Jain, 1977; Naik, 1989). Field notes were written on the spot and field data were collected during the field visits. Photographs have been taken using digital camera. Voucher specimens were identified with the help of flora including Hooker (1892-1897), Cook (1903), Diwanji *et. al.*, Gamble et al.(, 1915), Haines (1921-1924), Duthie (1960), Oomachan (1977), Shah (1978), Verma et.al. (1994), Mudgal et. al.( 1997), Naik et al. (1998), Singh et.al. ( 2001), Singh *et. al.* 2001; Roy, 1984. Some plant specimens were matched and confirmed in the regional herbarium of Botanical Survey of India, Allahabad .Recent up-to-date nomenclature of ICBN was followed.

# **Result and Discussion**

756 wild and naturalised flowering plant species have been reported from Harda district, MP These 756 plant species are distributed in 523 genera and 112 families. Dicotyledon includes 566 plant species, 399 genera and 90 families. Monocotyledons comprise of 190 plant species, 124 genera and 22 families (**Table1, Fig. 1**). Dicotyledons share 74.9 percent and Monocotyledones share 25.1 percent of the total taxa (**Fig. 2**). Average size of the family, in study area is 4.67 genera and 6.75 species. The ratio of monocot to dicot in respect to families 1:4.09, Genera 1:3.21 and species 1:2.97 respectively. The genus to species ratio for region is 1:1.44. Genus to species ratio for world is 1:13, for British India 1:7 (Hooker,1872-1897), India alone 1:5 (Karthiken 2000) and Madhya Pradesh 1:2.4. On the other hand, the ratio tends to match with the floristic composition of areas adjacent to the study area like, Indore 1:1.95,

	Dicot		Mor		
Category	No.	Percentage	No.	Percentage	Total
Family	90	80.4	22	19.6	112
Genera	399	76.3	124	23.7	523
Species	566	74.9	190	25.1	756

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Sudip Ray





Table-2: Comparison of genus to specie	s ratio of the	study area	a with some	other		
districts of M.P. India						

S. No.	District	Genus:species ratio	Total area (sq.km)	Forest area (sq km)	No.of sps in 10 dominant families
1.	Bhopal	1:1.5	2972	388.98	361
2.	Ujjain	1:1.5	6091	35.22	330
3.	Dewas	1:1.75	7020	1899	543
4.	Shivpuri	1:1.52	10278	NA	348
5.	Khargone	1:1.48	8030	1299	382
6.	Sidhi	1:1.63	10532	4442.46	358
7.	Indore	1:1.95	3821	523.00	556
8.	Ratlam	1:1.74	4861	349.53	473
9.	Harda	1:1.44	2644	781	422
10.	Jhabua & Dhar	1:2.09	14931	3059.59	632



Fig 2: Percentage of Dicot to Monocot taxa

Table-3:	I en dominant	families of the	e study area	compared v	with some distr	nct of M.P.

Harda	Bhopal	Khandwa	Dewas	Khargone	Indore	Ujjain
Leguminosae	Leguminosae	Poaceae	Leguminosae	Leguminosae	Leguminosae	Leguminosae
(102)	(90)	(162)	(136)	(101)	(146)	(83)
Poaceae	Compositae	Leguminosae	Poaceae	Poaceae	Poaceae	Poaceae
(89)	(59)	(102)	(131)	(75)	(137)	(72)
Compositae	Poaceae	Cyperaceae	Compositae	Euphorbiaceae	Cyperaceae	Compositae
(49)	(53)	(59)	(52)	(32)	(59)	(53)
Malvaceae	Acanthaceae	Compositae	Euphorbiaceae	Compositae	Compositae	Euphorbiaceae
(40)	(28)	(53)	(42)	(25)	(54)	(28)
Cyperaceae	Euphorbiaceae	Acanthaceae	Cyperaceae	Acanthaceae	Euphorbiaceae	Malvaceae
(32)	(28)	(43)	(41)	(25)	(38)	(18)
Lamiaceae	Scrophulriaceae	Euphorbiaceae	Acanthaceae	Cyperaceae	Acanthaceae	Acanthaceae
(26)	(24)	(40)	(34)	(23)	(32)	(16)
Apocynaceae	Verbenaceae	Convolvulaceae	Malvaceae	Malvaceae	Convolvulaceae	Cyperaceae
(24)	(20)	(27)	(23)	(18)	(26)	(16)
Amaranthaceae	Lamiaceae	Lamiaceae	Rubiaceae	Amaranthaceae	Scrophulriaceae	Amaranthaceae
(22)	(20)	(27)	(18)	(15)	(24)	(15)
Euphorbiaceae	Malvaceae	Malvaceae	Convolvulac	Lamiaceae	Lamiaceae (23)	Convolvulaceae
(20)	(20)	(26)	eae (17)	(13)		(15)
Convolvulaceae(	Convolvulaceae	Scrophulriaceae	Lamiaceae	Convolvulaceae	Rubiaceae (17)	Solanaceae
18)	(19)	(25)	(17)	(13)		(15)

Dewas 1:1.75, Khargone1:1.48 and Hosangabad1:1.72 (**Table-2**). There are 756 wild and naturalized species in the 2645 sq km where species density is 3.49.

Different growth habit of a total 513 plant species are herbs, 53 shrubs, 121 trees and 69 climbers. An analysis of life form shows that herbaceous species (68 %) exhibit, maximum diversity followed by trees (16%), shrubs (7 %) and climbers (9%). The relatively higher percentage of herbs may be due to predominant weed flora as well as low percentage of trees. (**Table 3 and Fig. 3**).

Leguminosae (102) is the most dominant family in the study area followed by Poaceae (89), Compositae (49), Malvaceae (40), Cyperaceae (32), Lamiaceae (26), Apocynaceae (24), Amaranthaceae (22) ,Euphorbiaceae (20) and Convolvulaceae (18) (**Fig. 4**). These Ten dominant families together contribute 404 species which account for 53.4 % of the total while remaining 102 families with a total



Fig 3: Ten dominant families of the study area



Fig 4: Dominant genera of study area

Life form	No. of species	Percentage (%)
Herbs	513	68
Shrubs	53	7
Trees	121	16
Climbers	69	9
TOTAL	756	100

Table- 4: Different growth forms observed



Fig. 5: Different life forms identified in study area

of 352 species representing 46.6% of the total flowering plant species. Ten dominant families of the study area have been compared with those of some districts of M.P. (**Table 4**). Poaceae is the first position in Khandwa districts while in other district Leguminosae is the first position in all district. The other families are more or less same in all districts differing is only in sequence of dominance. The present study reveals that Cyperus is the most dominant genus in the region including 19 species followed by Crotalaria (15), Euphorbia (12), Ficus (10), Ipomoea, Justicia, Grewia, Acacia, Senna and Indigofera (8) and Blumea, (7), Alysicarpus and Fimbristylis (6), Amaranthus, Dioscorea and Fimristylis, Sida (5), Alternanthera and Ziziphus (4) (**Fig:5**).

#### Assessment of Rare, Endangered and Threatened taxa (RET plants)

Phytodiversity of Harda district is facing different degree of threats due to heavy biotic pressure, habitat loss, megaprojects, overexploitation, trade value, overgrazing and intensive invasion of exotic species. Present study reports 91 rare and threatened flowering plant species which are distributed in 46 families and 86 genera (Table-3). Rare taxa are the effect of environmental damage because they occur in small population or at scattered very susceptible to localized habitats. Some other reasons may be reproductive mechanism and in viability of seeds. Through allelopathic effects, invasive species alter the population structure and natural dynamics of indigenous flora.

A taxon is critically endangered when facing high risk of extinction in the wild in immediate future. 14 species are observed in the study area under Critically Endangered category. Acampe praemorsa (Roxb.) Blatt. & Mc. Acorus calamus L., Hellenia speciosa (J.Koenig) S.R.Datta, Microchirita hamosa (R.Br.) Yin Z. Wang, and Eulophia picta (R.Br.) Ormerod are facing high risk of extinction. A taxon is endangered when it is not Critically Endangered but it is facing a very high risk of extinction in the wild in the near future. 29 plant species are recorded under this category. Asparagus racemosus Willd., Centella asiatica(L.)Urb., Crinum latifolium L., Gloriosa superba L., Habenaria marginata Coleb., Cynanchum acidum (Rox) Oken, Zingiber roseum (Roxb.) Roscoe are become endangered in the area. A taxon is vulnerable when it is not Critically Endangered or not Endangered but it is facing a very high risk of extinction in the wild in the near future. 21 plant species are found under vulnerable category. These plants are now common in the area but declining at alarming rate due harvesting for their medicinal value, overexploitation and trade value. Important plants of this category are Baliospermum solanifolum (Burm.) Suresh, Curculigo orchiodesGaertn., Drimia indica (roxb.) Jessop, Enecostema axillare (Poir. ex Lam.), Hemidesmus indicus (L.) R.Br. ex Schult, Chlorophytum tuberosum, Ceratosanthes palmata Urb., Tylophora rotundifolia (Roxb) Baker., Uraria picta. ([acq.) Desv. Ex. Dc.

Some invasive plants like Lantana camera L., Senna uniflora (Mill.) H. S Irwin & Barneby, Stachytarpheta jamaicencis (L.) Vahl., Pontederia crassipes (Mart.) Solms., Pistia stratiotes L. and solanum erianthum D. Don. are dominating over indigenous plants and native flora become threatened.

# Sudip Ray

Sr. No.	Botanical name	Vernacular	Locality	Status	Reason	Cons. Str.
		name				
1	Acampe praemorsa (Roxb.) Bla. & Mcm. Orchidaceae	Waierdo	Khirkiya	CR	LH,C	ESC, PTC
2	<i>Acacia penata</i> (L)Willd. <b>Leguminosae</b>	Raoni	Alanpur	R	L	Ins
3	Acorus calamus L. <b>Araceae</b>	Bach	Khirkiya	CR	Т	ISC
4	<i>Amorphophalus konkanesis</i> Hett. S. R. Yadav & K.S.Patil <b>Araceae</b>	Jangli suran	Bargadi	CR	Hm	ТС
5	Alangium savlifolum (L.f) Wangerin Cornaceae	Ankola	Rahatgaon	VU	Hm	ISC
6	Andrographis paniculata (Bru.f.) Wal. ex. Nes. Acanthaceae	Apmarg	Khirkiya	VU.	Hm	ISC
7	Aristolochia bracteolata Lam. Aristolochiaceae	Kidamar/Esa mul	Guthanian	VU.	L/OV	ESC, BG
8	Asparagus racemosus Willd. Asparagaceae	Satawa <del>r</del> i	Sirali	EN.	Г	ISC
9	Baliospermum montanum (Willd.) Muell. Euphorbiaceae	Jamalghotai	Makdai	EN.	L	ISC
10	Boerhaviia repens.L. Nyctaginaceae	Punarnava	Sontalai	VU.	Hm	CUL
11	Boswellia serrata Roxb. <b>Burseraceae</b>	Salai	Sirali	CR	OV	ISC
12	<i>Butea superba</i> Roxb. <b>Leguminosae</b>	Palasbel	Rahatgaon	R	L	ISC
13	<i>Cadaba fruticosa</i> (L)Druce <b>Capparaceae</b>		Alanpur	R	L / C	ISC
14	Carallocarpus coronopus Cucurbitaceae	Mirchikand	Makdai	EN	Hm/L	ISC
15	<i>Careya arborea</i> Roxb. <b>Lecythidaceae</b>	Kumbhi	Sirali	VU	L	RT
16	Cassytha filiformis Lauraceae		Sontalai	VU	LH	ISC
17	Catanaregam spinosa (Thin.)Tir.	Gelphel	Temgawoan	VU	D,L	ISC
18	<i>Centella asiatica</i> (L.) Urban <b>Apiaceae</b>	Brahami	Jamunya	EN	Hm	CU
19	Ceropegia bulbosa Roxb. Apocynaceae	kapari kand	Timarni	CR	Hm/ OV	ТС
20	Chlorophytum arundinaceum Baker. Asparagaceae	Musali	Charwa	VU	Т	ISC
21	<i>Citrullus colocynthis</i> (L.) Schard. <b>Cucurbitaceae</b>	Indrayan	Nayapura	VU.	I/OV	CU
22	R <i>otheca serrata</i> (L.) Moon <b>Lamiaceae</b>	Bhrangi	Chipaner	VU.	C / OV	ISC
23	<i>Cordia macleodii (</i> Griff.) Hook.F.Thom. Boraginaceae	Daiwas	Dhekna	R	D	RT

Table- 5: Rare and Threatened plants of Harda District, MP, India

24	Cheiolocostus speciosus (J.koening.)	Kavkand	Makdai	CR	Hm	ISC
	J.E.Sm.					
05	Costaceae					ICC
25	Commetina coroliana waiter Commelinaceae		Gogiya	к	C	15C
26	<i>Crateva religiosaForst.</i> L. Capparaceae	Barna	Tamagaon	R	С	ISC
27	Crinum latifolium L. Amarayllidaceae	Jaglikanda	Pokharni	EN.	Hm	ISC
28	Curculigo orchioides Gaertn. Hypoxidaceae	Kalimusali	Sontalai	VU.	Т	CU
29	<i>Curcuma angustifolia</i> Roxb Zingiberaceae	Thikur	Khardana	EN.	Т	ISC
30	<i>Curcuma decipiens</i> Dalzel Zingiberaceae		Rahatgaon	EN	Hm	ТС
31	Cullen corylifolium(L)Medik Leguminosae	Babhachi	Handiya	VU	Hm	CU
32	Cyperus divesDelile Cyperaceae		Remlawadi	R	С	ISC
33	<i>Digitaria abludens</i> (Roem & Schult) VU eldKamp <b>Poaceae</b>		Ramlawadi	R	Т	ISC
34	Drimia indica(Roxb.) Jessop Asparagaceae	Janglikando	Gtaniya	VU	Hm	CU
35	Diplocyclos palmatus(L)Jeffrey Cucurbitaceae	Ban kakadi	Handiya	EN	Hm	ISC
36	Desmodium oojeinense (Roxb.) H. Ohashi Leguminosae	Tinsa	Charwa	R	D	RT
37	Microchirita hamosa (R.Br)yin z Gesneriaceae		Timmarni	CR	С,Р	ISC
38	Eclipta prostrata(L)L. Asteraceae		Chipawar	VU	Hm	CU
39	<i>Erythrina suberosa</i> Roxb. <b>Leguminosae</b>	Pangar	Sirali	EN	L	ISC
40	Enecostema axillare(Poir ex Lam)A Raynal Gesneriaceae	Nai	Handiya	VU	Hm	CU
41	Eriolaena candolei(Willd.)VUerd. Malvaceae		Makdai	R	D	RT
42	Flemingia nana Roxb. Leguminosae	I	Magardha	EN	С	ISC
43	<i>Firmiania colorata</i> (Roxb.)R.Br Malvaceae		Kodaro	EN	D,L	RT
44	<i>Ficus cupulata</i> Haines <b>Moraceae</b>		Timarni	R	D	ESC,BG
45	<i>Geodorum densiflorum</i> (Lam.) Schl. Orchidaceae	Kukarkand/ Salammishri	Khardana	CR	Г	ISC , PTC
46	Gloriosa superba L. Colchicaceae	Kalihari	Sirali	EN	T/ OVU	ISC

47	<i>Gymnema sylvestre</i> (Retz)R.Br.Ex.Sch. <b>Apocynaceae</b>	Gudbel	Khirkiya	EN	Hm	ISC
48	<i>Gardenia tubifera</i> Wall ex Roxb. <b>Rubiaceae</b>		Siralia	VU	D	RT
49	H <i>abenaria digitata</i> Lindle. <b>Orchidaceae</b>	Vaanpyazi	Rahatgaon	CR	L	ESC PTC
50	Habenaria ferciferaLindle Orchidaceae	Devsundo	Sontalai	CR	Hm	ESC
51	<i>Habenaria marginata</i> Colebr. <b>Orchidaceae</b>	Bandoo	Sontalai	EN	Hm	ESC
52	<i>Haldina cordifolia</i> (Roxb.)Ridsdale <b>Rubiaceae</b>	Haldu	Makdai	R	L	ISC
53	<i>Hardwickia binata</i> Roxb. <b>Leguminosae</b>	Anjan	Nayapura	EN.	CLB	ISC
54	Helicteres isora L. Malvaceae	Marodfali	Handiya	VU.	Т	ISC
55	Hemarthia compressa(L.f)R.Br <b>Poaceae</b>		Khidkiya	VU	L	ISC
56	Hemidesmus indicus (L.) R.Br. Apocynaceae	Anantmul	Rahatgaon	EN.	OV	ISC
57	Hymenodiction orixense(Roxb.)Mabb Rubiaceae		Makdai	R	D	RT
58	Ipomoea hederifoliaL. Convolvulaceae		Handiya	VU	Hm	CU
59	<i>Kydia calycina</i> Roxb. <b>Malvaceae</b>	Barang	Khirkiya	VU.	L	ISC
60	<i>Leea macrophylla</i> Roxb. ex. Hornem. <b>Leeaceae</b>	Hatikan	Magardha	CR	I	ISC, CUL
61	L <i>ippia javanica</i> (Burm.f.)SprENg. <b>Verbenaceae</b>		Khirkiya	R	С	ISC
62	Ledebouria revoluta(L.f)Jessop Asparagaceae		Jamniya	R	Hm	CU
63	Millettia extensa (BENth) Baker Leguminosae	Agyo/Antamal a	Charwa	VU.	Hm/I	ISC
64	Nervilea concolor(Blume)Schltr. <b>Orchidaceae</b>		Sontalai	CR	L,C	ISC
65	Nothosaera brachiata(L.)Wight Amaranthaceae	Kamlad	Magardha	R	L	ISC
66	Oroxylum indicum (L.) Venten Bignoniaceae	Arlu	Rahatgaon	CR	Hm	ISC
67	Oryza rufipogon Griff Poaceae	JangliChawal	Ratatalai	CR	L	ISC- Tc/CAP
68	Plumbago zeylanica L. Plumbaginaceae	Chitrak	Sontalai	EN	Hm	ISC CUL
69	Pterocarpus marsupium Roxb. Leguminosae	Bijasal	Sirali	EN	OV	ISC
70	Pueraria tuberosa (Rox.ex.Wil.)DC Leguminosae	Bidari Kand	Dhekna	EN	OV	ISC
71	Rhynchostylis retusa (L.) Blume Orchidaceae	Kophuli	Sontalai	CR	С	ESC,TC
72	Samecarpus anacardium L. Anacardiaceae	Bhelwa	Magardha	EN	С	ISC

#### Advances in Botanical Research

73	Cynanchumacidum(Roxb.))Oken <b>Apocynaceae</b>	Somlata	Makdai	EN	Т	ISC
74	Schleichera oleosa L. <b>Asteraceae</b>	Kusum	Handiya	VU	OV	ISC
75	Chlorophytum tuberosum (Roxb) Baker Asparagaceae	Musli	Gutaniya	VU	C/OV	ISC
76	<i>Soymida febrifuga</i> (Roxb.)A. Juss. <b>Meliaceae</b>	Rohani	Khirkiyan	EN	OV	ISC
77	Smilax zeylanicaL. Smilacaceae		Handiya	EN	L	ISC
78	Spilanthaes calva DC Asteraceae	Akalkara	Rahatgaon	VU	I/OV	ISC
79	Stereospermum chelonoides (L.F.) DC Bignoniaceae	Padar	Charwa	EN	Hm	ISC
80	Strychnos potatorum L. Loganiaceae	Kaya	Lokhartalai	VU	Hm	CU
81	Tinospora cordifolia(Willd)Miers <b>MENispermaceae</b>	Gudbel	Handiya	VU.	Hm	ESC CUL
82	<i>Ceratosanthes palmata</i> Urb. Cucurbitaceae	Kudaliyo	Siralii	VU.	Hm	CU
83	<i>Tripogon</i> lisboaeStapf. <b>Poaceae</b>		Chapaner	R	С	ISC
84	Theriophonum dalzelliSchott. Araceae		Sirali	EN	L	ISC
85	<i>Tragia plukentii</i> RadclSm Euphorbiaceae		Khirkiya	R	С	ISC
86	<i>Tylophora rotundifolia</i> Buch. –Ham ex Wight <b>Apocynaceae</b>	Bhuleya bel	Rahatgaon	VU	Hm	CUL
87	<i>Uraria picta</i> (Jacq.) Des.ex.DC Leguminosae	Pithawan	Chipamer	VU	С	ISC
88	Viitex negundo L. Lamiaceae	Nidgundi	Khirkiya	VU	Т	CUL
89	<i>Viscum articulatum</i> Brum .f. <b>Santalaceae</b>	HaddiJod	Khardana	EN	D	ISC
90	Zeuxine strateumatica (L.) Schlechter Orchidaceae	Dhouli Jad	Sontalai	EN	Т	ISC
91	Zingiber roseum (Roxb.) Roscoe Zingiberaceae	Jangli Adrak	Sirali	EN	Т	ISC

### Abbreviations:

ISC: Insitu conservation, TC: Traditional conservation, CUL:Cultivation, ESC:Exsitu conservation, PTC: Plant Tissue Culture, BG:Botanical Garden, Hm :Harvesting of medicine, Hf: Harvesting of food, C:Climatic, L:Loss of habitat, LH:Loss of Host plant, OV: CLB:Indiscriminate collection of leaves and young branches. RT: Reintroduction. T:Trade, RT:Reintroduction, LH: Loss of Host

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